



A Brief History of
HERPETOLOGY
IN NORTH AMERICA
BEFORE 1900
by Kraig Adler



SOCIETY FOR THE STUDY OF AMPHIBIANS AND REPTILES • 1979

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AUTHOR'S NOTE

This circular consists of two companion essays, written as introductions for two anthologies of original papers illustrating the development of herpetology in North America before 1900. Editorial limitations by the original publisher prevented a fuller treatment and the proper referencing of statements, and also necessitated the emphasis on authors represented in the anthologies. Nevertheless, it is hoped that these essays will be of interest to students of American herpetology.

The two essays appeared as parts of the following works:

Herpetology in Eastern North America During the "Naturalist's Period" (1725-1850), p. 1-17. In K. Adler (ed.), *Early Herpetological Studies and Surveys in the Eastern United States*. Arno Press, New York Times Book Co., 1978. LC 77-81101; ISBN 0-405-10685-8.

Herpetology in Western North America During the Nineteenth Century, p. 1-17. In K. Adler (ed.), *Herpetological Explorations of the Great American West. Volumes I-II*. Arno Press, New York Times Book Co., 1978. LC 77-81100; ISBN 0-405-10682-3.

The original pagination is given in parentheses at the bottom of each page. Lists of the papers reprinted in the Arno Press volumes have been added in this printing, together with an index (pages 39-40).





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HERPETOLOGY IN EASTERN NORTH AMERICA DURING THE "NATURALIST'S PERIOD" (1725-1850)

IN AMERICA the early progress of biology — including herpetology, the scientific study of amphibians and reptiles — occurred relatively rapidly, even compared with its development in Europe. During the so-called "Naturalist's Period", the pioneer phase of descriptive natural history extending from about 1725 to the mid-nineteenth century, the fauna and flora of eastern United States were described and named so that by 1850 rather complete catalogues of the vertebrates, higher plants, and other major groups had been published. Within that brief span the herpetofauna of this region became as completely known as that in any other part of the world and, indeed, at that time even Europe had nothing on reptiles to compare with the crowning achievement of the period, John Edwards Holbrook's *North American Herpetology* . . . (1842). This collection of papers is intended to chronicle the development of studies on amphibians and reptiles during this period and begins with the reports of early European travelers, some later immigrant naturalists who remained in their adopted country, and eventually the first native-born naturalists who depended upon the methodologies devised in Europe but who, with nationalistic pride, worked quite independently of their European colleagues in studying the biota of the vast American continent.

The story of those first explorers is one of bold personal adventure, lonely vigils, extreme perseverance and even great suffering. Some of them sought fame and riches and others were motivated out of sheer curiosity or the scholarly pursuit of Truth. For a few the theological interpretation of Nature dominated their work, since Nature was thought to provide the greatest illustration of the grand design of the Creator. This view permeated the thinking of some of the best scientists of that period including John Ray (1628-1705), the pioneer English naturalist whose remarkably modern concept of species was later systematized by Linnaeus. In 1691, Ray published *The Wisdom of God Manifest in the Works of the Creation*, a very successful book that went through eleven editions by 1743. Not surprisingly some of the early naturalists were clergy; others were physicians or members of the aristocracy. Many of them were sponsored by their sovereigns, wealthy noblemen or merchants; but few indeed were associated with institutions, because the age of science at museums and

universities did not fully develop until the nineteenth century. The published works of these first naturalists were fascinating mixtures of actual observations, hearsay, legend, and superstition to which were often added illustrations that were frequently inaccurate and even fantastic. Yet in spite of many weaknesses the best of these early observers provided accurate accounts of the American fauna and flora.

The exploits of those early explorers are illustrated by the life of the most influential naturalist of pre-Revolutionary America, Mark Catesby (1683-1749), honored in herpetological nomenclature by the name of the bullfrog, *Rana catesbeiana*. Catesby first came to America in 1712 when he joined the household staff of his brother-in-law, a prominent physician in colonial Williamsburg. He was a self-taught naturalist and spent his spare moments making notes and sketches of the local plants and animals of Virginia. By the time he returned to England in 1719 he had already developed a modest reputation as one “. . . pretty well skill'd in Natural history who designs and paints in water colours to perfection . . .” He soon returned to America to explore further and eventually published his book *Natural History of Carolina, Florida and the Bahama Islands* . . . (1731-1747). The preparation and publication of this classic work took some 20 years, during which time Catesby supported himself as a nurseryman. He was too poor to have the plates engraved professionally and as he could not find enough sponsors for such a project, he undertook the laborious task of learning the art of engraving. He hand colored the large plates himself which, since there were 156 sets printed each containing 220 plates, totaled a staggering 34,320 separate plates, an accomplishment that can only be fully appreciated by seeing the exquisite coloring and artistry first hand.

Catesby's work was not profound but consisted of careful, often highly accurate observations having a vibrant quality that can only be provided by the field naturalist himself. His book quickly became the most authoritative treatment of the natural history of British North America before the Revolution. Its imposing format, in which the organisms are illustrated in approximately life size, set the standard for natural history treatises of the day and was to influence Audubon's own contributions nearly a century later. It is a continuing source of amazement what these early naturalists could accomplish. They were men of modest means, largely without governmental or institutional support, who explored and studied in remote areas under extreme hardship and sometimes at the risk of their lives, yet they created great works that are at least equal in scope and beauty to anything modern biologists have produced. What inspiring people they were!

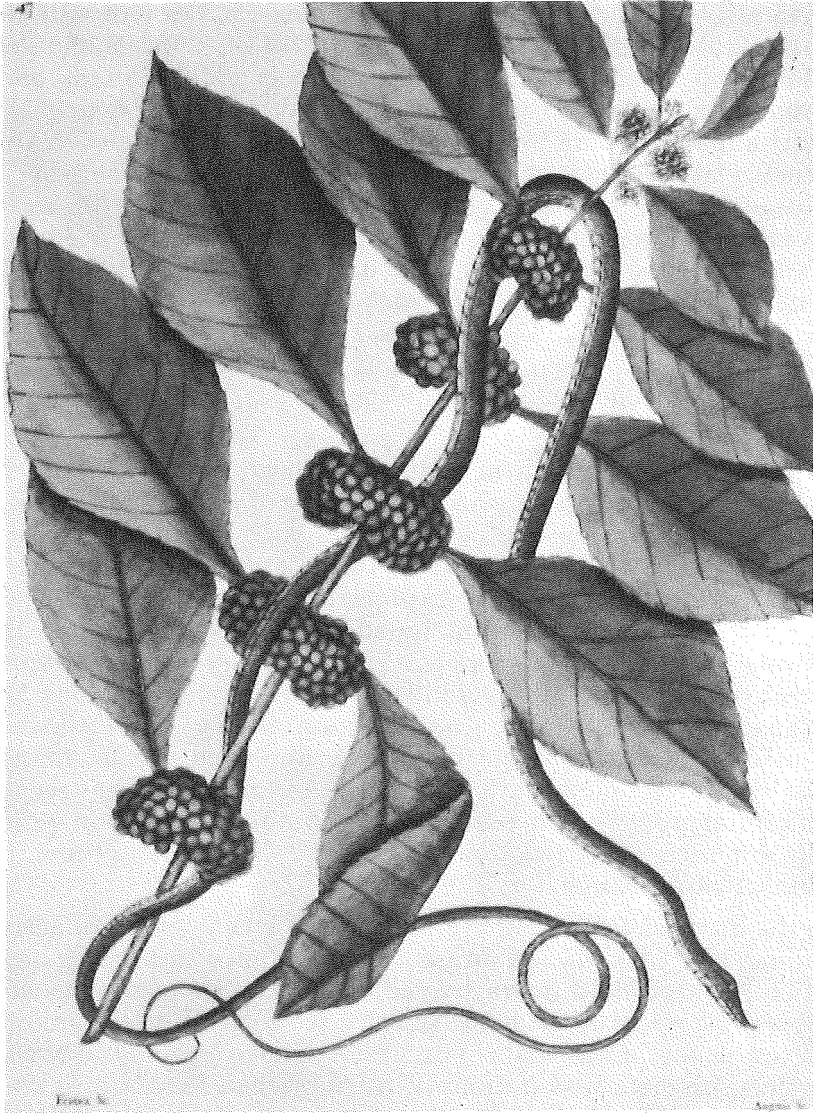


FIGURE 1: "*Anguis gracilis caeruleo-viridis*, The blueish green Snake," plate 47 from Mark Catesby's great *Natural History*, volume 2. The figure shows the artistic and harmonious display of plant and animal material typical of that book in which the drawings, engravings and even hand coloring of the original plates were done by Catesby himself. The animal depicted is now known as the keeled greensnake (*Opheodrys aestivus*), about which Catesby quite accurately wrote: "This harmless Snake frequents the Branches of Trees, and very nimbly squirms among the Leaves, living on Insects, which I believe are its only Food. Their usual Size and Length is that of [Catesby's original] Figure. They are all over green, enclining more to blue than yellow. The Nose of this Species turning up, sufficiently distinguishes it from another green Snake [*O. vernalis*] I shall hereafter describe."

Two other important explorers of Catesby's day were Sir Hans Sloane (1660-1753) and Pehr Kalm (1715-1779). Sloane was personal physician to the Crown and his collection of books, manuscripts and specimens, purchased by means of a special act of Parliament, became the nucleus of the British Museum (Natural History). He was also a prominent naturalist and succeeded Sir Isaac Newton as president of the Royal Society. From 1687 to 1689 he was in the New World as physician to the governor of Jamaica, and made the observations which were later published as *A Voyage to the Islands Madera, Barbados, Nieves, S. Christophers and Jamaica . . .* (1707-1725). His most lasting contribution, however, was the encouragement of natural history studies and naturalists in particular, including Mark Catesby whom he patronized.

Kalm, a Swedish naturalist and pupil of Linnaeus, had previously gained fame for his exploration of Russia. His book, *En Rêsa til Norra America . . .*, first published in three volumes in Stockholm during 1753-61, was based on his initial visit to America. Like other pioneer explorers of America, both Sloane and Kalm were especially intrigued with rattlesnakes and their accounts, like those reprinted in this anthology, were reasonably accurate ones when they made the observations themselves. Even the "fascinating power" or "hypnotizing ability" of rattlesnakes and other serpents as described by Sloane (and also in the later paper by Barton), observations long held in disrepute, has recently been reinterpreted as an example of predatory mimicry in which a snake enhances its attractiveness to prey and thereby lures them within striking range.

In the decades following Linnaeus there was a flurry of activity to name and classify all animals and plants according to the artificial system laid down by Linnaeus. European species could be systematized, but those of America were still largely unknown even to the best naturalists. The first Linnaean catalogue of North American animals was published by Forster in 1771, but it was to be another century before the vertebrates of eastern United States were finally named and classified with any degree of comprehensiveness. As a result, the work of European and American naturalists differed markedly during that period. In London, Berlin and especially in Paris, naturalists were producing encyclopedic works about the animals and plants of the world, epitomized in Buffon's *Histoire Naturelle . . .*, the first edition of which was published in 44 volumes over the period 1749-1804. These massive and all-inclusive works provided the basis both for comparative studies and for the earliest treatises dealing with evolution such as Lamarck's *Philosophie Zoologique . . .* (1809), the first major treatment of this author's famous theory of animal evolution, and later the classification of the entire animal

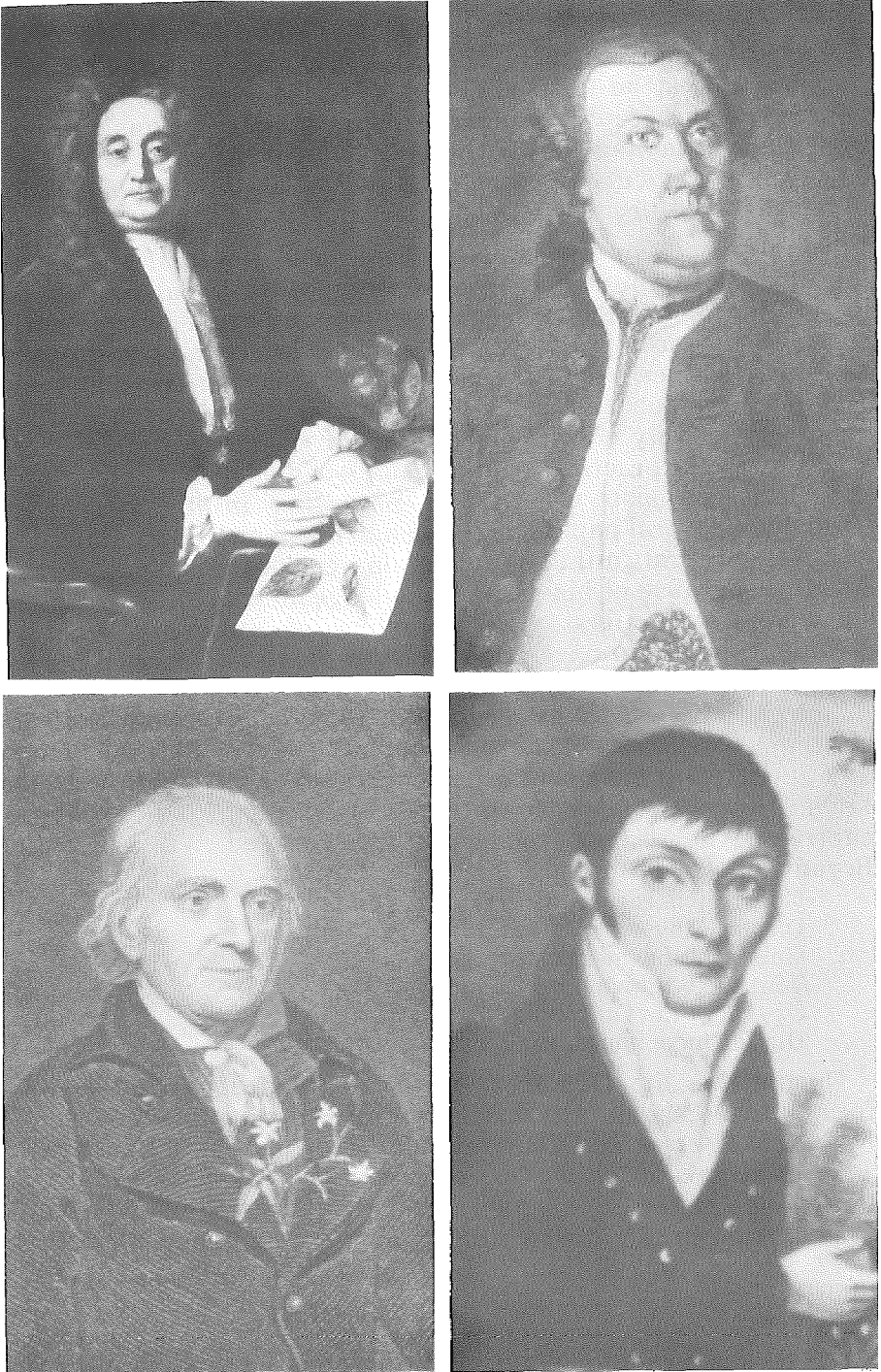


FIGURE 2 (clockwise from top left): Hans Sloane, Pehr Kalm, C. S. Rafinesque, William Bartram.

kingdom by Baron Cuvier in his *Le Règne Animal . . .* (1817). Yet these classic studies had little impact upon biological work in America because so little was known about its fauna. It was necessary first to discover and describe the species before generalizations could be made about their relationships and distributions, a stage not truly reached until the work of Agassiz and, more particularly, that of Cope in the latter part of the nineteenth century.

Nonetheless, natural history was an increasingly active discipline at the time of and immediately following the Revolution. It was then a preoccupation or at least an avocation of some of the most prominent Americans, including several who were political leaders of the new nation. It is widely known that Thomas Jefferson and Benjamin Franklin did research of their own and actively encouraged science in general, although both emphasized the practical sciences. But it is not so well appreciated that Jefferson also was a fine naturalist in his own right, publishing several papers on living and fossil mammals; indeed, it was he who first initiated studies on vertebrate paleontology in America. Because of his broad knowledge he was often consulted on biological matters while Secretary of State and even as President. Jefferson once remarked that "Nature intended me for the tranquil pursuits of science, but rendered them my supreme delight." When he was President he made certain that the government-sponsored surveys did not neglect natural history and at one point even kept grizzly bears caged on the White House lawn! However, such an interest in natural history did not captivate the general public and encouraged William Cullen Bryant, one of Jefferson's critics, to lament:

Go, wretch, resign the President's chair,
 Disclose thy secret measures, foul or fair,
 Go search for horned frogs
 'Mid the wild wastes of Louisiana bogs
 Or where the Ohio rolls his turbid stream
 Dig for huge bones, thy glory and thy theme.

During this time the first American scientific societies were formed by educated men in several of the principal cities, chiefly New York, Boston and Charleston, but especially in Philadelphia. The earliest of these organizations was the American Philosophical Society, begun in Philadelphia in 1742 and derived in part from the "Junto", a club founded by Benjamin Franklin in 1727. At this time naturalists depended on correspondence with their colleagues throughout the world for new information and such letters were read and discussed at regular meetings. Later, these societies established printed journals where their members and correspondents could make their discoveries known also to naturalists in other, more distant regions. The first such journal in

America, the *Proceedings of the American Philosophical Society*, was initiated in 1744. Within the next 75 years more than a dozen other scientific periodicals were established in cities along the Eastern coast. Most of the contributions to these learned journals were by Americans since Europeans thereafter shifted their attention to the natural history of their far-flung colonies, work that was not without nationalistic overtones.

Some of the early naturalists who contributed to the study of amphibians and reptiles — no one then was so specialized as to be called a herpetologist — spent much of their time in the field. William Bartram (1739-1823), Philadelphia-born son of the botanist John Bartram, was a friend of Thomas Jefferson and a well-known traveler, poet-naturalist and artist whose lucid writings were considered contributions both to natural history and to literature. His most famous work, *Travels Through North & South Carolina, Georgia, East & West Florida...*, first published in Philadelphia in 1791, resulted from a four-year excursion primarily to acquire seeds and specimens for English botanists and horticulturists. His was the most widely-read contemporary account of America; yet for all its popularity it sometimes misrepresented nature. We owe to Bartram some of the most entrenched myths concerning the alligator, certainly one of the most magnificent animals of the new continent and one whose true life history we are only now beginning fully to understand. Reading Bartram's remarks on the alligator here reprinted, it is no wonder that Europeans for a long time regarded America to be a veritable wilderness. Actually, his accounts of other animals are credible ones and if Bartram had not been so inconsistent in his use of Latin binomials the scientific names accepted for many of our commonest Eastern animals and plants would today be attributed to him. Later authors gave more accurate accounts of the alligator, but the damage was done. The report by Jean Jacques La Foret Audubon (1785-1851), better known to his English audience as John James Audubon, was remarkably accurate, depicting the alligator as the less terrifying beast that it is. Audubon was a keen observer of nature, as good artists have to be.

Clearly the most unusual field naturalist of post-Revolutionary America was the idiosyncratic Constantine Samuel Rafinesque (1783-1840) who sometimes appended to his name that of his mother's family, Schmaltz. He was born in Turkey of European parentage and visited America twice, finally returning to stay in 1815. Precocious as a child, he was educated at home by tutors which may partly account for some later eccentricities and his inability to get along with peers. There is certainly no more pathetic figure in all of American natural history than his. He was perhaps the most generally gifted naturalist of all — some called

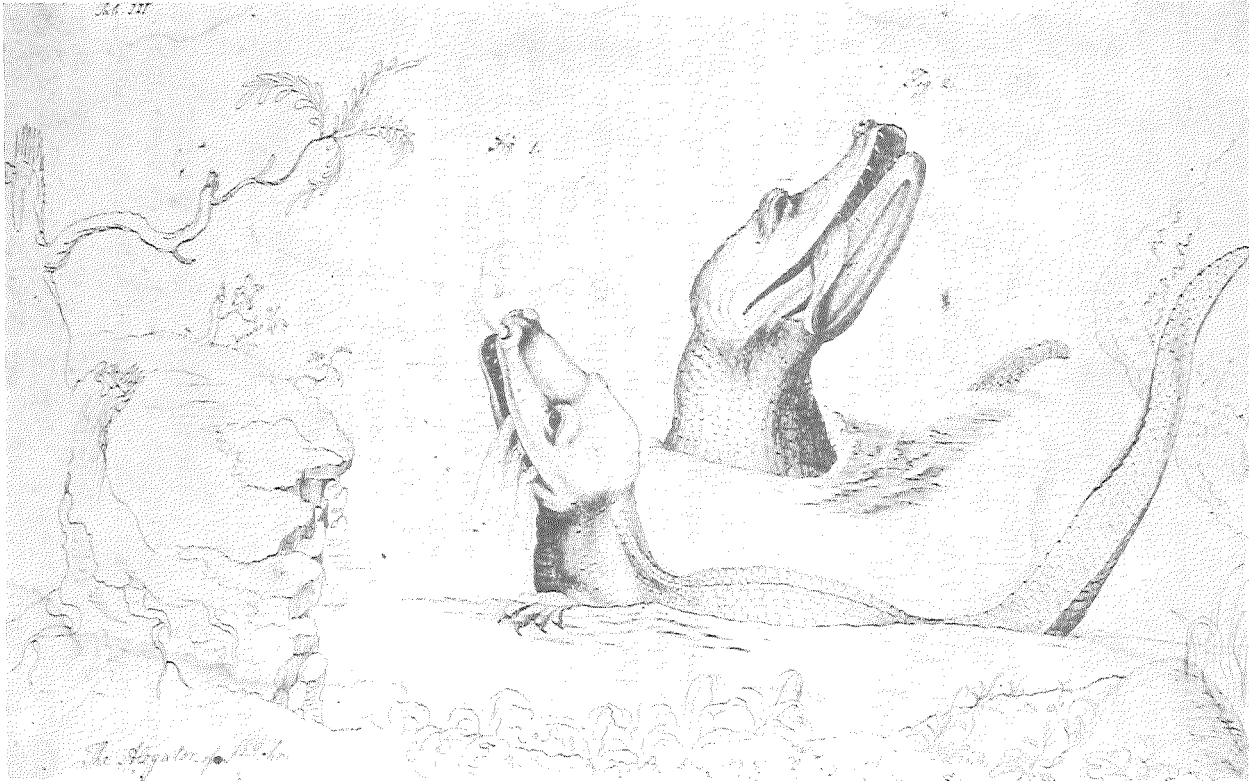


FIGURE 3: “The Alegator of St. Johns [River, east Florida],” probably William Bartram’s most famous drawing. In the notes accompanying this original sketch, Bartram states that it “. . . represents the action of this terrable monster when they bellow in the Spring Season. they force the water out of their throat which falls from their mouth like a Cataract & a steam or vapour from their Nostrals like smoke.”

him a genius — yet for all his talent he was ignored, even shunned by his contemporaries. Eventually denied access to the leading American journals, he published in Europe, in local newspapers and even started his own scientific periodicals. His dedication to natural history was so intense that the minimum standards of courtesy and dress often went unattended and sometimes he seemed downright oblivious to his surroundings. His first meeting with Audubon, for example, is legendary. In his frenzy to capture a bat that was flying about in Audubon's log cabin, Rafinesque dashed around stark naked and unwittingly demolished Audubon's valuable Cremona violin which he had used for a swatter!

Rafinesque achieved some formal success in 1819 when he was named Professor of Botany and Natural History at Transylvania College in Kentucky (the first academic post in natural history west of the Alleghenies), but it was to be short lived. Under pressure from the college he resigned in 1826, laying a curse on the college which mysteriously was burned in a great fire in 1828. Rafinesque spent his final years in Philadelphia and earned a living as a banker but eventually he succumbed to exhaustion and to a succession of diseases. When he died he was living in a garret, all alone amidst his collections and manuscripts and so poor that his only possession of any intrinsic value was the gold medal awarded to him in 1832 by the Société de Géographie in Paris, the value of which at Rafinesque's death was determined to be only about \$16. Were it not for some fast last-minute negotiations by a friend, his landlord would have sold Rafinesque's body to a medical school in payment for rent due.

Rafinesque's estrangement from the scientific community was due as much to his odd personal characteristics as it was to his scientific methods and ideas. His zeal for describing new species was undiminished by the prior claims of others or by the lack of actual specimens. It is said that Audubon repaid him for the violin incident by later sending descriptions of fictitious fishes which were eagerly named and included by Rafinesque in his *Ichthyologia Ohiensis* . . . (1819-1820). Yet he was a keen observer of all of nature and many of his plant and animal names have been retained. So that he could better observe nature, he crossed the Allegheny mountains five times on foot, walking across Pennsylvania, Ohio and Kentucky. He never liked horses, having to dismount for every flower; "horses do not suit botanists," he once said. In addition to his descriptions of amphibians, reptiles, fishes and other animals and plants, he had very advanced notions concerning classification. He was one of the first to depart from the Linnaean system, preferring to set up a more natural one. These early attempts were, not surprisingly, abortive ones and in any event did not endear him to his American colleagues. He had

modern opinions on the theory of evolution long before Darwin and was an advocate of the modern germ theory of disease transmission. He also became a pioneer in the study of American archeology and Indians, astronomy, and in the progress of higher education. Even as a businessman he was inventive, being the first to introduce the coupon system.

For all his brilliance Rafinesque failed to impress his American peers, lacking the orderly procedure and documented proof expected of scientists. Many dismissed him solely on personal grounds; for others his views on classification and evolution were too advanced to comprehend, ironically views more fully appreciated at the time in his native Europe. One wonders what would have been the course of biological science had Rafinesque been able to earn the respect and attention of his colleagues. Thus deprived of the esteem and cooperation of other naturalists, he eventually worked alone. The two papers reprinted here give a glimpse of the range of his ability and the seed of his weakness. The one on water snakes is an odd mix of truth and myth. The other gives a quite respectable account of the life history of the copperhead, although the paper was promptly criticized by Thomas Say, in an article also reprinted in this collection. Were Rafinesque not so credulous and more willing to restrict his writing to his own keen powers of observation, he could have been the leading American naturalist of his generation.

Other prominent contemporary naturalists were associated with universities or museums in several of the major cities, but the leading place for herpetological studies from 1790 to 1835 was in Philadelphia where a remarkable group of educated men, most of them practicing medical doctors, provided the focus for American natural history studies in general. One of the earliest was Benjamin Smith Barton (1766-1815), a physician and professor at a college which later merged with another to form the University of Pennsylvania. Barton was the pioneer teacher of natural history in America, beginning his professorial duties in 1789. He had studied in Edinburgh where, under the renowned Rev. John Walker, natural history was an integral part of the medical curriculum. Barton published on many groups, some said too many because it diminished his ability to make truly significant contributions to any one of them. He was, however, the author of the first textbook on botany published in the United States (*Elements of Botany . . .*, first edition in 1803) and among other diverse contributions he was the first to draw attention to the presence of limy ground water in regions where goiter is prevalent in humans and domesticated animals, a relationship that was not fully explained until more than a century later. He died at the age of 49, most of his projects unfinished.

Another writer on American herpetology at that time was Ambroise Marie François Joseph Palisot de Beauvois (1752-1820), the naturalist, writer and explorer of Africa, Santo Domingo and America. Beauvois was a prominent Frenchman who held public office and who was later elected to the prestigious Institute of France. His comparatively sophisticated training is clearly demonstrated in the article reprinted here dealing with "Amphibia" which in the Linnaean sense included all amphibians and reptiles. Beauvois gave the first description of the Eastern diamondback, largest of all rattlesnakes, and also first distinguished and named the genus to which the copperhead and cottonmouth moccasin belong.

About two decades later Philadelphia produced still another generation of naturalists — including Godman, Green, Harlan, J. E. LeConte, Maclure, Ord, the Peales, Say, and Troost — comprising the so-called "Philadelphia School" which was then the most influential force in American natural history. Thomas Say (1787-1834) was a pharmacist by training but subsequently became a curator at the museum of the Academy of Natural Sciences. He had participated in Major Long's expedition to the Rocky Mountains in 1819-1820 and was regarded as one of the most active zoologists of the day, publishing extensively in entomology, conchology, herpetology and paleontology. His dedication to science was truly heroic and it is recorded that for several years "he slept in the hall of the Philadelphia Academy of Natural Sciences, where he made his bed beneath the skeleton of a horse and fed himself on bread and milk." Say was one of the founders of the Academy (in 1812) and for over ten years totally devoted himself to its progress. He organized the accumulation of preserved animals (often specimens collected by himself), wrote articles about them and in the early years of the Academy he even did the typesetting and printing of its *Journal*, a total involvement in his work reminiscent of Catesby. Later he joined Maclure in Indiana where the latter co-founded in 1825 the ill-fated attempt to set up a socialistic Utopia along the lower Wabash River. Scientific men ran the commune and the experiment attracted widespread attention at home and abroad. Several European naturalists, including Prince Maximilian of Prussia and the Frenchman Charles A. Le Sueur, paid visits to New Harmony which as a result became the place from which a number of the commonest Midwestern amphibians and reptiles were first described.

Another of this group was John Eatton LeConte (1784-1860), member of an illustrious lineage of American naturalists. LeConte had served as a topographical engineer in the U. S. Army performing harbor surveys and arranging for the defense of Savannah during the War of 1812, but he resigned from his commission in 1831 to devote all his time to natural history. The

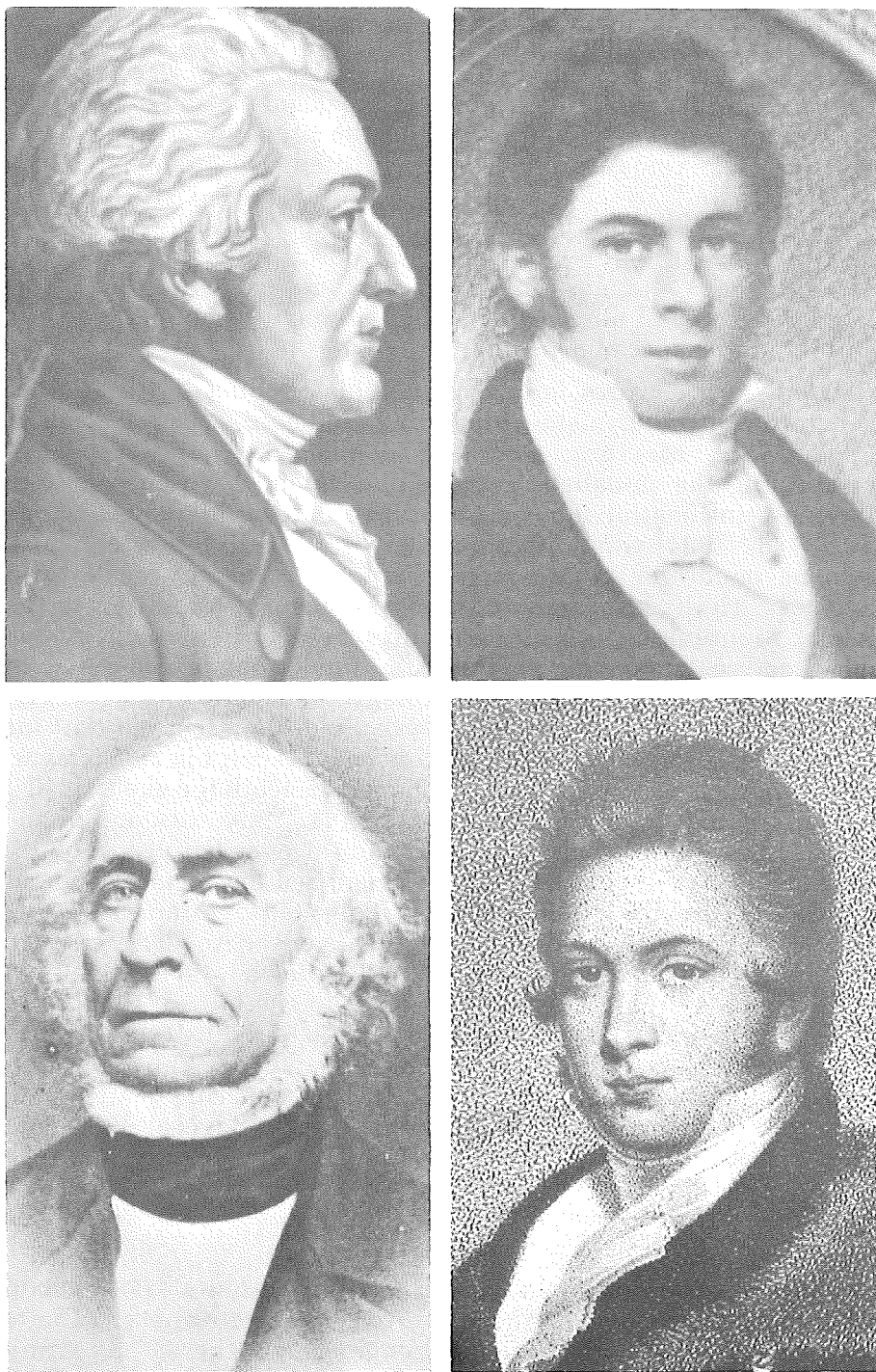


FIGURE 4 (clockwise from top left): B. S. Barton, Thomas Say, Richard Harlan, J. E. LeConte.

paper of LeConte's reprinted here deals with the dwarf siren, now called *Pseudobranchius*, one of the several permanently-gilled American salamanders whose seemingly arrested development and proper classification posed special problems for European naturalists.

The most prolific student of reptiles in the Philadelphia group was Richard Harlan (1796-1843), a practicing physician and noted authority on anatomy and paleontology. He produced the first comprehensive review of American mammals by an American in his *Fauna Americana* . . . (1825). Several of his papers are reproduced here, the first an exhaustive review of the anatomy and classification of certain aquatic salamanders. Besides being an exceptionally careful and critical study for its time, it exemplified the developing confidence which American workers showed in challenging the statements of European authorities, especially when these applied to American forms. Harlan's paper also included examples of the fine illustrations that were becoming a routine and essential part of descriptive papers in herpetology and other natural sciences. Often the most enduring part of an early naturalist's publication were the plates, providing they had been well executed. But Harlan's most important herpetological publications were his reviews of the known reptiles and amphibians of the United States, the first such comprehensive summaries ever put together. These were good compilations, based on the literature and Harlan's own work as well as the growing collections of the several Philadelphia museums, but they suffered from the lack of fresh specimens and from undue dependence upon the systems of higher classification developed by Europeans. Nevertheless, this was the initiation of a systematic cataloguing of North American species, beginning with a preliminary edition published in three parts in the *Journal of the Academy of Natural Sciences of Philadelphia* in 1826-1827 and here reprinted. This was later revised and added to in the edition of 1835 published in a volume of Harlan's collected works. Primitive though these catalogues were, they established a basis for the work of others and indeed greatly facilitated the comprehensive review of American herpetology by Holbrook that was to follow.

With Harlan's catalogues in hand, regional workers could undertake their labor with less confusion and risk of duplication of the work of others. The next decade or two saw a number of such studies completed by regional pioneers such as Kirtland in Ohio, Storer and De Kay. David Humphreys Storer (1804-1891), a physician and one-time dean of Harvard Medical School, was better known for his *Synopsis of the Fishes of North America* published in 1846. The generic name of our common brown and red-bellied snakes was proposed in his honor. His report on the

reptiles and amphibians of Massachusetts was a good review, careful attention being given both to taxonomy and natural history, but even Storer was a little too gullible and admitted sea serpents into his catalogue. James Ellsworth De Kay (1792-1851), Storer's contemporary, was more careful and produced what was in its day the model for state herpetological surveys. Although trained as a physician, De Kay preferred natural history and was for a long time associated with the Lyceum of Natural History in New York City. He was commissioned to write all of the zoological sections of the *Natural History of New-York*, a task that took him eight years to complete and is still regarded as the most ambitious of the state zoologies. In his report De Kay not only gave a good account of the amphibians and reptiles found or to be expected in New York State but listed extralimital species as well, thus expanding the book's usefulness to workers in other areas along the Eastern coast.

All of these surveys were necessary prelude to the final phase of the pioneer century of American herpetological studies, the publication of the natural history classic *North American Herpetology*. . . Its author, John Edwards Holbrook (1796-1871), was a native American who, after medical training at Pennsylvania and Edinburgh, took up the study of lower

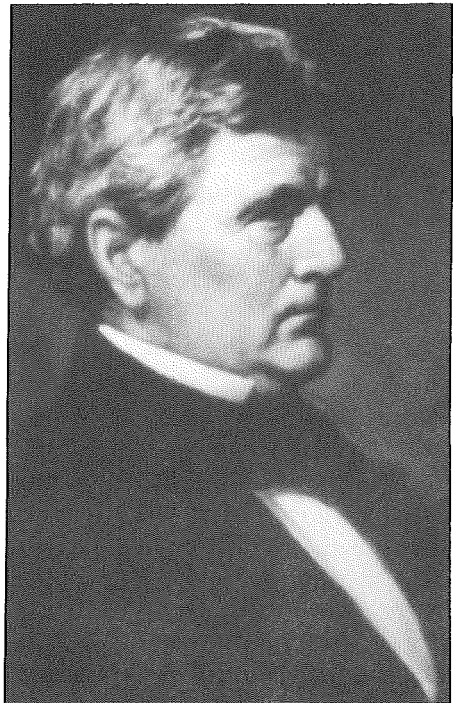


FIGURE 5 (left to right): D. Humphreys Storer, John E. Holbrook.

vertebrates. He elected to describe and illustrate all of the amphibians and reptiles then known to inhabit the United States, but his initial attempt was aborted in 1840 after four volumes had appeared. Apparently his high standards for the illustrations had not been met, but also the species accounts were arranged too haphazardly. The definitive edition, in five volumes, was issued in 1842 and in it each of the nearly 150 species was described, figured, and its life history and distribution discussed. Holbrook was obsessed with the plates. He employed the best artists he could hire, sought out living specimens at all costs for them to use as subjects, and issued substitute color plates whenever better ones could be produced. Sometimes he even refused to send new versions of a volume until the subscriber had returned the earlier ones to be destroyed.

This monumental treatise earned him the title "Father of American Herpetology", not unjustly; but one must realize that his work represented the culmination of the efforts of many naturalists over two centuries. Holbrook's great accomplishment was the careful synthesis of the work of other naturalists together with his own observations and field work along the entire Eastern coast. He thus provided the basic work of reference for subsequent herpetological studies. He later shifted his attention to fishes and published only one additional title in herpetology, a short list of the reptiles of Georgia. Indeed, few scientists have secured so distinguished a reputation based upon so few publications. Holbrook's active research continued up until the Civil War during which time he served as chairman of the Examining Board of Surgeons for South Carolina and, in spite of his age, as a field doctor for the Confederate troops. But the war broke his spirit and laid waste to his personal collections and library at his home in Charleston, and Holbrook never resumed his researches.

However, more profound changes were taking place in American science during this closing half century of the "Naturalist's Period." Gradually the era of exploration was giving way to classification and to generalization. Central to the shift was the popularization of natural history, studies that were more prevalent at the secondary school level or "academies" than in the colleges. As a result large numbers of ordinary Americans became as familiar with Latin, Greek, grammar, mathematics and history — then the basic curriculum — as they were with the wonders of Nature, a course of study that was developed earlier in Europe. No single event symbolized this shift more than the arrival in America in 1846 of the Swiss naturalist Jean Louis Rodolphe Agassiz (1807-1873) who had been a protégé of Cuvier. Although only 39 at that time, Agassiz had an international reputation and introduced to America European laboratory methods in anatomy

and embryology. Agassiz's influence on American science was widespread and he, more than anyone else, ushered in the "Scientific Period." Agassiz's lectures were inspiring and he sought to popularize science through them and his widely-used textbooks. Among scientific colleagues Agassiz was most respected for his powers of generalization and for his many excellent monographs on animals, the most outstanding of which was his four-volume *Contributions to the Natural History of the United States of America*. The first two volumes of his *Contributions* dealt with turtles, a subject of special interest to him. Agassiz also built at Harvard the greatest university zoological museum and the lineages of his many students can be found in most of the major universities in America today.

Although much exploration remained to be done beyond the Appalachian frontier, biological work in America after the Civil War shifted to studies in embryology, anatomy and evolution, and the majority of scientists then as now were associated with universities. The "Naturalist's Period" in America thus came to a close, prolonged for a few decades longer in the West perhaps, but the era of major biological exploration in the United States was over.

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1 June 1977

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Acknowledgments and Credits

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Fig. 1: Catesby plate (History of Science collection, Cornell University).

Fig. 2: Sloane (National Portrait Gallery, London; courtesy Hunt Institute, Pittsburgh); Kalm (National Museum of Finland; courtesy Hunt Institute, Pittsburgh); Rafinesque (Frances Carrick Thomas Library collection, Transylvania College; courtesy Hunt Institute, Pittsburgh); Bartram (American Philosophical Society, Philadelphia).

Fig. 3: Bartram drawing (Fothergill collection, courtesy British Museum [Natural History]).

Fig. 4: Barton (American Philosophical Society, Philadelphia); Say (from H. Weiss and G. Ziegler's *Thomas Say . . .*, 1931); Harlan (Historical Society of Pennsylvania, Philadelphia); LeConte (Hunt Institute, Pittsburgh).

Fig. 5: Storer (Academy of Natural Sciences, Philadelphia); Holbrook (National Gallery of Art, courtesy National Portrait Gallery, both Washington).

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HERPETOLOGY IN WESTERN NORTH AMERICA DURING THE NINETEENTH CENTURY

WITHIN sixty years after the American Revolution the fauna and flora of the original colonies were well known. Like other groups of organisms, the reptiles and amphibians had at first been described and named by Europeans but by 1800 this task had fallen largely to a small but highly productive group of American naturalists primarily centered in Philadelphia. Their work led to the first comprehensive, illustrated survey of the reptiles of the United States, John Edwards Holbrook's *North American Herpetology* . . . (1842). This treatise, exhaustive though it was, covered only a small part of the new nation, then primarily an area from New England south to the peninsula of Florida ceded by Spain in 1821. The few species then known from west of the Appalachian frontier were included by Holbrook but gave a limited and, as we now know, grossly incomplete picture of the rich herpetofauna of that part of America — but this void was to be rapidly filled.

The Lewis and Clark expedition in 1803-1806 yielded the first reasonably accurate measure of the true width of the continent and the vastness of the unexplored territory. It was not until after the War of 1812 that Americans began looking westward, particularly at the immense Louisiana Territory which had been purchased from France in 1803. In 1819-1820 a scientific party under Major Stephen H. Long surveyed the Great Plains and reached as far west as the Rocky Mountains of Colorado. This group included Thomas Say, the prominent Philadelphia naturalist, who described some of the commonest species of amphibians and reptiles from the plains region. Long's party was attached to the "Yellowstone Expedition", a military detachment sent up the Missouri River to pacify the Indians and prevent incursions by British traders into American territory. This combination of military and scientific purposes became the pattern for other government surveys in the West, but there was not to be another major one for some twenty years, due in part to Major Long's exaggerated reports of the unsuitability of the West, which he and others referred to as the "Great American Desert", for settlement and agriculture.

During this period there was relatively little biological exploration west of the Mississippi River except along the Pacific coast where small but historically important collections were

made. During 1827-1829 P. E. Botta, a naturalist aboard the French merchant ship *Héros*, collected in California and the specimens were later described by Henri Marie Ducrotay de Blainville (1777-1850), an anatomist and one of the successors to Baron Cuvier at the Muséum National d'Histoire Naturelle. Perhaps the most peculiar novelty taken by Botta was a small stump-tailed snake belonging to the boa family which was named in the collector's honor by de Blainville. During the period 1838-1842 there was also an important American survey of the West coast, that of the U. S. Exploring Expedition under the command of Charles Wilkes. The herpetological collections from this extensive survey of the whole Pacific region were studied and written up by Charles Girard. But the only significant herpetological work in the interior of the West during the period from Long's expedition until the topographical surveys in the 1840s was that of a Rhenish prince who devoted most of his life to natural history and ethnology.

Alexander Philipp Maximilian (1782-1867) of the Prussian principality of Wied, located at Neuwied along the Rhine in what is now West Germany, was easily the most titled and best trained scientific observer to explore the West during the first half of the nineteenth century. After serving as a major-general in the Napoleonic wars, Maximilian resigned from the Prussian Army in 1814 and promptly embarked on an expedition to Brasil that was to establish his reputation as an explorer, ethnologist and a naturalist of the first rank. The results of the prince's exploration in the coastal forests of Brasil were published in his extensive book *Reise nach Brasilien in den Jahren 1815 bis 1817*, issued in 1820-1821, and also in an atlas illustrating the animals and plants (*Abbildungen zur Naturgeschichte Brasiliens*, 1822-1831). Later, at the age of 50, he left the comforts of his palace once again to make his second (and last) celebrated exploration, the ascent of the great Missouri River in the northern plains of North America. Maximilian's written accounts of this trip are second in importance only to those of Lewis and Clark as a record of the biota and people of the trans-Mississippian region. Maximilian's report was published in parts over the period 1838-41 under the title *Reise in das innere Nord-Amerika . . . in den Jahren 1832 bis 1834*; there were also several foreign language translations of this scientifically-important and widely-read work. At that time Illinois and Missouri were the frontier states and beyond them lay Indian country into which relatively few whites had gone before. It was indeed fortunate that a person of such ability witnessed this Indian civilization in its final days of glory, because three years after Maximilian's return to Europe a smallpox epidemic wiped out approximately one quarter of the entire Indian population along the Missouri. And those who were not killed by

disease later fell victim to excessive whiskey consumption, military encounters and finally to the onslaught of settlers.

Maximilian arrived at Boston in July 1832, and wintered at New Harmony, Indiana, where a socialistic commune had been established along the Wabash River. There the prince befriended Thomas Say, whose official duties in the community were described in his title, Superintendent of Literature, Science and Education. Together with Say, Maximilian collected local amphibians and reptiles and those that were new to science the prince subsequently named. Maximilian eventually reached St. Louis where he boarded the American Fur Company's small steamboat *Yellowstone* to ascend the Missouri, the longest river in North America. In 1833 the Missouri was considered the most treacherous of Western rivers, although now long-since tamed by a system of dams. Today it is difficult to imagine that the dangers to Maximilian and his small party in this now-civilized region were so great, but his journal records bear testimony to the great risks that he took. Maximilian belonged to that breed of romantic explorers to whom the rigors associated with discovery were not only endured but, apparently, even necessary for the experience to be savored to the fullest possible extent.

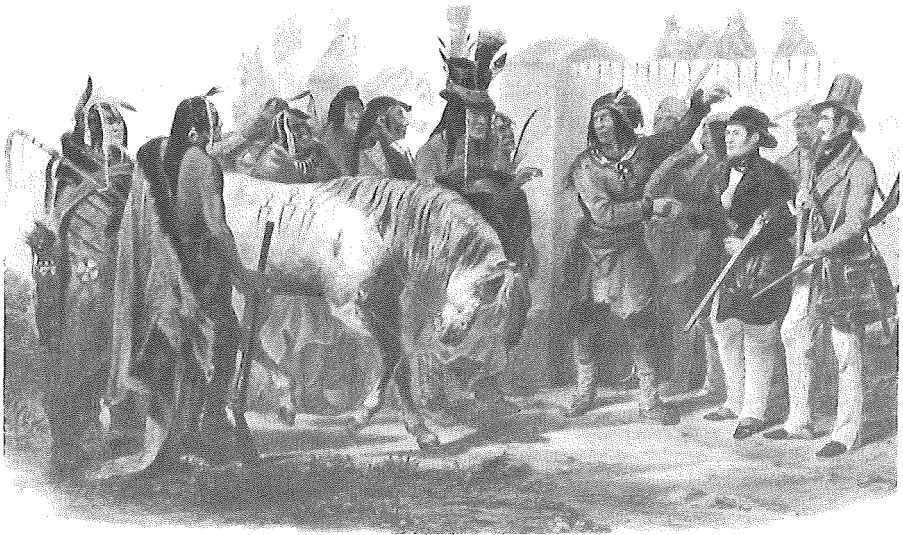


FIGURE 1. Maximilian being introduced to Indian chiefs at Fort Clark where the prince spent the bitter winter of 1833-34. Karl Bodmer, the artist who captured the visual record of Maximilian's expedition, is at the prince's left.

Accompanying Maximilian was the young Swiss painter Karl Bodmer (1809-1893) whose watercolor landscapes and portraits of Indians and their dwellings comprise the most extensive pictorial representation of the time, as photographic techniques had not yet been developed. Early in August, after a journey of nearly 2700 miles from St. Louis, Maximilian reached the westernmost point of the trip, Fort McKenzie, near the present-day city of Great Falls, Montana. But Maximilian did not remain long and left on September 14th to ship down the Missouri to Fort Clark and there emulate Lewis and Clark by spending the winter among the Mandan and Minnetaree Indians. It was a tribute that very nearly cost him his life.

Maximilian's party, numbering only seven, utilized a small, heavily-laden boat and thus were completely exposed to depredations by the various tribes along the Missouri and to the physical dangers posed by the river itself. But to Maximilian this sort of travel was preferable to that on the steamboat, as he could stop on command wherever he wished to collect specimens or reconnoiter. Finally, on November 8, 1833, they reached Fort Clark in what is now central North Dakota. This was a typical frontier fort, small (Maximilian recorded that the stockade was only 45 paces square), and having a total white population averaging about a dozen. The forts along the Missouri were operated by the trading companies which at that time were primarily interested in animal pelts. Although St. Louis was only five weeks away by boat, Maximilian chose to spend the next five months at Fort Clark during which time he made undoubtedly the most important observations of the entire trip.

Life in the fort was spartan, but the extended stay allowed time for detailed observations of the local Indians and extensive collections of artifacts and natural history specimens. Because there was no military protection at the fort, Maximilian and the other whites were at the mercy of Indians in the nearby encampments who made frequent trips to the fort to trade goods but also to help themselves to virtually anything else they wanted, thus producing confrontations that required all the diplomatic skills Maximilian and the other whites could muster. The winter was a particularly brutal one, with temperatures often below -20°F and sometimes even below -40° ; on one occasion the mercury sank into the ball and froze! The buckets of water in Maximilian's own living quarters froze solid as did Bodmer's paints. These were no royal quarters, yet Maximilian persevered and continued to interview Indians and trappers and even spent some nights in nearby Mandan huts. Eventually the fort went on starvation rations when the last dried meat was consumed at Christmas time. Thereafter, except for occasional buffalo kills, the food consisted of weak coffee and maize boiled in water. Like

others at the fort, the prince eventually contracted scurvy and nearly died but the long winter finally broke and fresh fruits could be brought upriver to the fort. Maximilian's party reached St. Louis late in May and he left the United States shortly after, his great adventure over and his contribution to American natural history and ethnology forever established.

This was the last major expedition by a foreigner for in 1842 the American government sent the first of what was to become a steady flow of surveying parties into the West. The earlier expeditions, together with the scattered reports of trappers and scouts — the legendary "mountain men" — provided some knowledge of the West, but the practical inadequacy of that knowledge was abruptly recognized in 1845 when México refused to acknowledge the legality of Texas's annexation by the United States and war seemed inevitable. Accurate maps of the area along the Mexican border did not exist and President Polk promptly dispatched a team of surveyors under William Hemsley Emory (1811-1887). Lieutenant Emory belonged to that small band of mostly West Point-trained army officers who made up the Corps of Topographical Engineers, a group whose exploits are collectively as colorful and heroic as any other explorers in history. Although never at any time having more than 36 officers, this tiny group more than any other succeeded in laying the foundation for uniting the continental nation. Their primary tasks were to produce maps, lay out boundaries and gather information relevant for settlements; in short, they served as a "Department of Public Works" for the Old West. But they performed valuable scientific work as well, taking meteorological measurements and, where possible, amassing collections of specimens. Some of them, like Emory, were in close contact with the leading scientists in the East and thus played a vital role in describing the biota of the West. Emory himself was a flamboyant character with red whiskers and picturesque language who looked more like a cavalryman than the engineer he was. His ruggedness, an essential requisite for survival in the Old West, was first demonstrated in 1846 during the Battle of San Pasqual when Mexican troops attempted to recapture southern California. With Kit Carson as their guide, Emory's detachment of dragoons surprised the Mexican squadron of lancers and they mounted a classic all-out cavalry charge. Emory joined the commanding general at the head of the column and eventually became the hero of the battle when he killed a Mexican lancer who was about to finish off the general. Immediately after the Mexican war ended in 1848, a commission was established to survey the new boundary and Emory was placed in charge but because of political squabbles the resulting reports, including the one by Baird on reptiles here reprinted, were not published until a decade later.

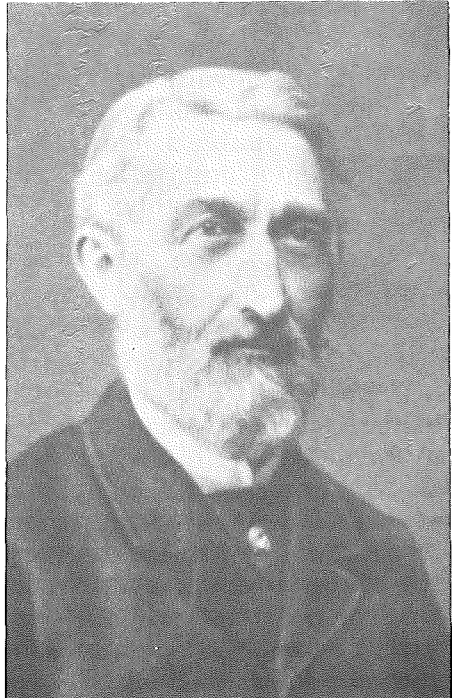


FIGURE 2 (clockwise from top left): Maximilian, W. H. Emory, Charles Girard and Spencer F. Baird.

When these Western collections were sent to Washington the government assigned them to the Smithsonian Institution where they fell into the able hands of Spencer Fullerton Baird (1823-1887). Baird had joined the Smithsonian shortly after it was founded in 1846 and was given the primary task of building up a natural history collection. He was precocious as a student and following graduation from college at the age of 17 he spent a year on his own studying nature; on one occasion he covered 400 miles on foot in 21 days studying birds in the Pennsylvania mountains. By age 22 he had returned to his alma mater as Professor of Natural History. Baird's own preserved collection, together with that of the Wilkes Expedition mentioned earlier, formed the nucleus of the Smithsonian's to which he added assiduously, both from government-sponsored surveys and through exchanges with other museums. Baird himself did highly competent studies on these collections and published major treatises on all the vertebrate groups. Besides being a fine naturalist Baird was an extraordinarily accomplished administrator and organizer, becoming the first Commissioner of Fish and Fisheries in 1874 and later the head of the Smithsonian Institution itself in 1878. He was also instrumental in setting up the famed oceanographic institute at Wood's Hole. But in spite of his many official duties Baird never forgot the influence of his own teachers who included Audubon and devoted much of his time to encouraging aspiring young naturalists.

Baird's herpetological work often was in collaboration with his chief assistant, Charles Frédéric Girard (1822-1895), a Frenchman by birth who had accompanied his teacher Louis Agassiz to America in 1847. Girard participated briefly in some of the Western surveys, but most of his work was done at the museum in Washington. Shortly before the Civil War began Girard went to France and later supplied the Confederate army with drugs and surgical supplies. Although he returned to the United States briefly in 1863 to tour the Southern states, he spent the remainder of his life practicing medicine in France. Another of Baird's protégés, Robert Kennicott (1835-1866), performed much of the actual laboratory work. Kennicott was later named director of the Chicago Academy of Sciences but shortly thereafter died, at the age of 30, on an expedition to Alaska. Together, Baird and his associates described and named a large proportion of the reptiles and amphibians of the West, particularly the lizards and snakes which are so numerous in the Southwest. Baird's published work in herpetology, unlike his on birds and mammals, consisted of little more than lists or descriptions of new species and had few critical comments on classification or biology although in fairness it should be mentioned that Baird's extensive manuscript review of North American reptiles and amphibians was never published

and instead was incorporated into the major reviews of those groups by E. D. Cope. Nevertheless, Baird's papers included in this anthology form the foundation of our knowledge of many Western species of amphibians and reptiles.

During the 1850s government-sponsored expeditions penetrated into many different parts of the West. Captain Howard Stansbury was ordered to study the basin of the Great Salt Lake including the indigenous Indian tribes and, perhaps more importantly, the area that had been settled in 1847 by the Mormons. Later, friction between the "Desert Saints" and Federal officials precipitated the brief Mormon War of 1857-1858 and the maps and extensive observations obtained earlier by Stansbury confirmed the continuing need for such surveys. The reptiles collected on this expedition were written up by Baird and Girard, including a new genus of lizards named in honor of the Ute Indians. Further to the south, Captain Lorenzo Sitgreaves departed from Albuquerque in 1851 in order to explore the Zuñi and Colorado rivers; he eventually reached San Diego, exploring a route which was later to be appropriated by the Santa Fe Railroad. This survey included a naturalist, Samuel Washington Woodhouse (1821-1904), whose collections of reptiles and amphibians were later studied by the prominent Philadelphia physician and naturalist Edward Hallowell (1809-1860). Woodhouse had developed an interest in

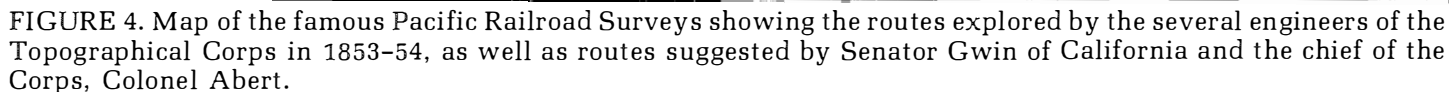


FIGURE 3. Survey party of the Corps of Topographical Engineers camped on the prairie at the Red Fork of the Arkansas River, June 1850. Standing in front of the horse is S. W. Woodhouse, the party's surgeon and naturalist, his pistol, knives and rifle displayed at his side.

natural history through a childhood association with the Academy of Natural Sciences in Philadelphia. Officially he was the surgeon for Sitgreaves's detachment, but in the course of his allied zoological activities got a Yavapai arrow through his leg and was bitten by a rattlesnake, costing him the use of his hand for months. Small recompense it was that Girard named a toad in his honor. In 1852, captains Randolph Barnes Marcy and George B. McClellan explored in Arkansas, Oklahoma and northern Texas, successfully discovering the source of the Red River, and their herpetological collections were also published by Baird and Girard. Goetzmann describes in detail these and other army surveys in the American West, providing maps of the major routes.

The all-consuming political controversy during this period was the struggle of expansionists to secure year-round lines of communication with the Pacific coast, a debate that was heightened when California joined the Union in 1850. Like the Mexican dispute before it, this controversy became enmeshed in the mounting political and sectional differences in the country that eventually led to civil war. The focal point for these and many other differences was the debate in Congress over the proper location for a transcontinental railroad. In desperation the government attempted to break the political deadlock by appealing for an objective scientific judgment that held out the promise of an impartial solution. Accordingly, on 2 March 1853 Congress authorized a railroad survey which called for simultaneous reconnaissances along about a dozen major routes. The final published report included a separate account for each route, usually referred to by the name of the chief engineer or by the parallel or both, but the whole survey was so complicated and the political aspect so confusing that the public documents are a bibliographer's nightmare, although Meisel gives the best accounting.

The attempt to decide the issue on strictly scientific grounds was an abject failure and a Southern route was chosen largely on political and economic grounds. Despite the fact that the railroad surveys failed in their primary purpose, they provided a great scientific opportunity to explore the West and at government expense. Baird fully recognized this tremendous potential and quickly saw to it that naturalists were attached to most of the surveys and that their collections were returned East for study and publication. These were truly the harvest days for the Eastern museums. A few of the naturalists recommended by Baird, like James Graham Cooper (1830-1902), wrote up their own accounts and also provided the earliest first-hand life history data. Cooper had served in the Civil War and was later associated with the California Academy of Sciences. He is better known for his



ornithological work; indeed, the Cooper Ornithological Club was named in his honor in 1893.

During the Civil War the railroad surveys were suspended but were eventually succeeded by the various explorations of the territories and geological surveys in the 1870s. These studies were undertaken by a new generation of naturalists including Henry Crècy Yarrow (1840-1929), a Union Army surgeon during the War and a participant in Wheeler's Survey in the West; Elliott Coues (1842-1899), the preeminent ornithologist and, like Yarrow, also an Army doctor later associated with the Smithsonian Institution; and Henry Wetherbee Henshaw (1850-1930), an explorer-naturalist of the West and a noted ethnologist. The dominant herpetologist of the day, however, was Edward Drinker Cope (1840-1897). Cope had been a protégé of Baird and also came under the influence of Joseph Leidy, professor at the University of Pennsylvania and once America's leading paleontologist. But Cope was quite unlike Baird and Leidy in temperament and style. While they preferred the quiet solitude of academic work, Cope abhorred routine and only accepted a university professorship when he could no longer support himself through private means. Publishing his first paper while only nineteen, he became the dominant figure in American zoology during his professional lifetime and his influence in anatomy, paleontology and biology was truly international in scope. During the 1870s Cope participated in several of the Western surveys and it was during this period that his famous feud with O. C. Marsh of Yale College began. At stake were the enormous collections of vertebrate fossils, especially those of dinosaurs, being unearthed mainly in the West and, ultimately, dominance of the field of paleontology. Cope was the better scientist but Marsh had available massive personal resources and also influential friends, so the result was a virtual standoff. Before the dispute ended when Cope died, the rivalry had engulfed the National Academy of Sciences, the Geological Survey, the Smithsonian Institution and many of America's leading biologists, paleontologists and geologists.

Cope's most epochal contributions were in paleontology but he also published extensively on living vertebrates including reptiles and amphibians. The scientific journal *Copeia*, dealing with lower vertebrates, was named in his honor. Although Cope described hundreds of new genera and species in his more than 1400 published works, his descriptive research was erratic and often annoyingly sketchy and inattentive to detail. He was clearly more at home in generalizing his work, in erecting higher classifications based on morphology, and in explaining animal distributions on a continental basis. Though a confirmed neo-Lamarckian, he was Darwinian in approach: his mind could easily sweep across vast quantities of data to produce grand generalizations. But the state



FIGURE 5 (clockwise from top left): J. G. Cooper, H. C. Yarrow, Alfredo Dugès and Edward D. Cope.

of biology in America, particularly that in the West, was then more in need of describers and namers and Cope's modern approach to many topics was generally ignored until the early part of the twentieth century.

During this same period, similar surveys were also being conducted in México which had been visited by many European naturalists during the nineteenth century, but the most extensive collections were those of the French and British. The French effort was an adjunct to the attempt by Napoleon III to establish a puppet Mexican empire under Archduke Maximilian of Austria, but after the latter's execution in 1867 in the peasant uprising led by Benito Juárez, the legitimate president of México, the scientific field party had to return to France. The biological results were published in the series *Mission Scientifique au Mexique et dans l'Amérique Centrale*, during the period 1868-1909. The massive volumes on reptiles and amphibians took nearly forty years to complete. The parallel British work was undertaken in a completely different way, being the joint project of two Cambridge University classmates, Frederick Du Cane Godman and Osbert Salvin, who privately sponsored an extensive expedition that resulted in the famous series *Biologia Centrali-Americana*, published during the period 1879-1915. One of the first collections in the Baja California peninsula was made by the French naturalist Léon Diguët whose specimens were reported on by François Mocquard (1831-1917) of the Muséum National d'Histoire Naturelle in Paris. But after these foreign visits México was left practically without any naturalists except for an immigrant Frenchman, Alfredo Augusto Delsescautz Dugès (1826-1910). Dugès travelled about the country making collections of all animal groups and provided the first comprehensive lists of the herpetofauna of his adopted country. The contribution reprinted here is perhaps his most important one to Mexican herpetology and may seem modest even by the scientific standards of the day. However, one must recall that unlike his contemporaries in America and Europe Dugès worked in isolation from major museum reference collections and he also suffered from chronic illnesses including deafness. Moreover, throughout his residence in Guanajuato he supported himself through a private practice as a gynecologist and his services as professor and director of the museum at the local college were purely voluntary.

To this point in time the Darwinian Revolution had had very little impact in herpetology, even on the brilliant Cope. Species descriptions were invariably typological and the importance of population and geographic variability within species was not appreciated. The exploration of the West had yielded descriptions and lists of species but little more. It was a logical extension of the

descriptive phase of natural history, the "Naturalist's Period", which had ended about 1850 in the East. It was another generation of biologists who were to use essentially modern concepts and procedures to survey and classify the reptiles and amphibians of the American West and to usher in the modern era in herpetological studies. This transition has usually been credited, above all, to Leonhard Hess Stejneger (1851-1943) who had left his native Norway in 1881 after a brief career as a lawyer. He came to the Smithsonian Institution and for a number of years worked with birds and mammals but at the age of 38 he turned his attention to herpetology which was surely more in need of his considerable talents. During a long career at the Smithsonian Institution Stejneger produced a steady stream of careful taxonomic studies on American reptiles and amphibians and was the principal author of a series of important herpetological checklists that standardized nomenclature. Stejneger also participated in the final stages of that earlier era of Western exploration and, among other contributions, wrote accounts on collections made by the Biological Survey in Arizona and California under the supervision of Vernon Orlando Bailey (1864-1942), one of the Survey's collectors in its early days and later himself a prominent naturalist.



FIGURE 6 (left to right): Leonhard Stejneger and John Van Denburgh.

All of these Western studies were finally consolidated in the work of John Van Denburgh (1872-1924) who from 1894 was associated with the California Academy of Sciences in San Francisco. As shown in his short paper on specimens he collected in the Columbia River basin in 1892, even as a student at Stanford University Van Denburgh was interested in the habits and distribution of reptiles and amphibians. Van Denburgh wrote extensive reviews of many groups of Western amphibians and reptiles and did many state surveys, leading eventually to his first monograph, *The Reptiles of the Pacific Coast and Great Basin*, published in 1897, which covered all of the coastal states plus Idaho and Nevada. Like Holbrook's work some fifty years before, Van Denburgh synthesized the exploration and work done by naturalists over the preceding century; this work was later greatly expanded in Van Denburgh's two-volume work, *The Reptiles of Western North America* (1922).

At last the bulk of America's kinds of reptiles and amphibians had been described and classified and the general limits of their ranges defined. Biologists thus had a suitable foundation on which to build. The ensuing work of the twentieth century has therefore emphasized the reevaluation of species as groups of geographically-varying populations, studies on the ecology and behavior of amphibians and reptiles and of their physiology, topics which continue to occupy us to this day. Yet the names of those hardy men whose explorations provided the foundation of our present knowledge have not been forgotten, emblazoned as they are in the names of Western mountain peaks and passes, rivers and towns. Here too is a happy instance of the often-descried practice of giving people's names to newly discovered organisms, persons whose sacrifices and toil might otherwise be forgotten. Their names are thus immediately familiar to students of American herpetology: Lindheimer, Berlandier, Wislizenus, Gambel, Marnoch and other primarily freelance collectors; Stansbury, Emory, and Graham, all topographical engineers; and the army surgeons Kennerly, Mearns, Woodhouse, Hammond and Yarrow (whose name, when Latinized, forms the specific epithet *jarrovi*). There were also other military personnel who collected specimens, including commissioned officers (Couch, Marcy), army surveyors (Schott, Clark), and even a one-time Minister to Mexico and Secretary of War, Poinsett. One genus of lizards was named by Baird for John Xántus (alias Louis de Vésey in several of the survey reports), a strange character who was once an army medical assistant in Kansas and briefly served as United States consul at Manzanillo in México. Other scientific names honor naturalists such as Say, LeConte and Henshaw, the geologist Hayden and Biological Survey collectors (Merriam, Bailey). The patronyms in themselves are perhaps uninteresting and

sometimes may seem to be an impediment to the proper use of scientific terminology. But these names and the lives of the frontier naturalists they honor provide the key to a fuller, even inspiring knowledge of our rich herpetological heritage, a history not unworthy of our attention yet today.

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map have been kindly supplied by the following institutions and organizations:

Fig. 1. Maximilian and Indian chiefs (copperplate engraving from Maximilian's *Reise in das innere Nord-Amerika . . .*, 1838-41; courtesy Cornell University).

Fig. 2. Maximilian (Hunt Institute, Pittsburgh); Emory (from F. Moore's *The Rebellion Record . . .*, vol. 10, 1867); Girard (from *Bulletin of the United States National Museum*, vol. 41, 1891); Baird (from *Annual Report of the Smithsonian Institution for 1897*).

Fig. 3. Survey party (from E. Hume's *Ornithologists of the United States Army Medical Corps . . .*, 1942).

Fig. 4. Map of Pacific Railroad Surveys (from W. Goetzmann's *Army exploration in the American West . . .*, 1959; courtesy Yale University Press).

Fig. 5. Cooper and Yarrow (both from E. Hume's *Ornithologists of the United States Army Medical Corps . . .*, 1942); Dugès (Hunt Institute, Pittsburgh); Cope (Historical Society of Pennsylvania, Philadelphia).

Fig. 6. Stejneger (Academy of Natural Sciences, Philadelphia); Van Denburgh (California Academy of Sciences, San Francisco).

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